

IN THE CLAIMS:

1. (Currently amended) A method for preparing a protected article, comprising the steps of
providing the article;
depositing a bond coat onto an exposed surface of the article; and
producing a thermal barrier coating on an exposed surface of the bond coat, wherein the step of producing the thermal barrier coating includes the steps of
depositing a primary ceramic coating onto the exposed surface of the bond coat, wherein a surface of the primary ceramic coating comprises columnar grains having facing surfaces,
depositing a cerium-oxide-precursor compound onto ~~an exposed surface~~ the facing surfaces of the columnar grains of the primary ceramic coating, wherein the cerium-oxide-precursor compound is not cerium oxide with cerium in a +4 oxidation state, and
heating the cerium-oxide-precursor compound in an oxygen-containing atmosphere to form cerium oxide with cerium in the +4 oxidation state adjacent to the ~~exposed surface~~ facing surfaces of the primary ceramic coating and leaving air-filled gaps between the facing surfaces of the columnar grains.
2. (Original) The method of claim 1, wherein the step of providing the article includes the step of
providing the article as a nickel-base superalloy article.
3. (Original) The method of claim 1, wherein step of providing the article includes the step of
providing the article in the form of a component of a gas turbine engine.
4. (Original) The method of claim 1, wherein the step of depositing the bond coat includes the step of
depositing a diffusion aluminide or an aluminum-containing overlay bond coat.

-3-

5. (Original) The method of claim 1, wherein the step of depositing the primary ceramic coating includes the step of depositing yttria-stabilized zirconia as the primary ceramic coating.

6. (Original) The method of claim 1, wherein the step of depositing the cerium-oxide-precursor compound includes the step of furnishing $(\text{NH}_4)\text{Ce}(\text{SO}_4)_3$ as the cerium-oxide-precursor compound.

7. (Original) The method of claim 1, wherein the step of depositing the cerium-oxide-precursor compound includes the step of infiltrating the cerium-oxide-precursor compound into the exposed surface of the primary ceramic coating.

8. (Cancelled)

9. (Currently amended) A method for preparing a protected article, comprising the steps of

providing a nickel-base superalloy article that is a component of a gas turbine engine;

depositing a bond coat onto an exposed surface of the article; and

producing a thermal barrier coating on an exposed surface of the bond coat, wherein the step of producing the thermal barrier coating includes the steps of

depositing a yttria-stabilized zirconia primary ceramic coating in a columnar form onto the exposed surface of the bond coat,

infiltrating a cerium-oxide-precursor compound from an exposed surface of the primary ceramic coating into the primary ceramic coating, wherein the cerium-oxide-precursor compound is not cerium oxide with cerium in a +4 oxidation state, and

heating the cerium-oxide-precursor compound to form cerium oxide with cerium in the +4 oxidation state adjacent to the exposed surface of the primary ceramic coating.

-4-

10. (Original) The method of claim 9, wherein the step of depositing the primary ceramic coating includes the step of depositing yttria-stabilized zirconia having about 7 percent yttria by weight.

11. (Original) The method of claim 9, wherein the step of depositing the cerium-oxide-precursor compound includes the step of furnishing $(\text{NH}_4)\text{Ce}(\text{SO}_4)_3$ as the cerium-oxide-precursor compound.

12. (Cancelled)

13. (Currently amended) A method for preparing a protected article, comprising the steps of
providing the article;
depositing a bond coat onto an exposed surface of the article; and
producing a thermal barrier coating on an exposed surface of the bond coat, wherein the thermal barrier coating comprises

a primary ceramic coating on the exposed surface of the bond coat, wherein a surface of the primary ceramic coating comprises columnar grains with facing surfaces, and wherein the primary ceramic coating has an excess of oxygen vacancies therein, and

a sintering-inhibitor region at a surface of the primary ceramic coating, wherein the sintering-inhibitor region comprises cerium oxide with cerium in ~~the +4~~ an oxidation state that removes oxygen vacancies from the primary ceramic coating and in a concentration greater than a general cerium oxide concentration in the primary ceramic coating, and wherein there are air-filled gaps between the facing surfaces of the columnar grains.

14. (Original) The method of claim 13, wherein the step of providing the article includes the step of providing the article as a nickel-base superalloy article.

-5-

15. (Original) The method of claim 13, wherein step of providing the article includes the step of
providing the article in the form of a component of a gas turbine engine.

16. (Original) The method of claim 13, wherein the step of depositing the bond coat includes the step of
depositing a diffusion aluminide or an aluminum-containing overlay bond coat.

17. (Original) The method of claim 13, wherein the step of producing the thermal barrier coating includes the step of
depositing yttria-stabilized zirconia as the primary ceramic coating.

18. (New) The method of claim 13, wherein the step of producing includes the step of
forming the cerium oxide with cerium in the +4 oxidation state from a precursor compound that is not cerium oxide with cerium in a +4 oxidation state

19. (New) A method for preparing a protected article, comprising the steps of
providing the article;
depositing a bond coat onto an exposed surface of the article; and
producing a thermal barrier coating on an exposed surface of the bond coat, wherein the thermal barrier coating comprises
a primary ceramic coating on the exposed surface of the bond coat, wherein the primary ceramic coating has an excess of oxygen vacancies therein, and
a sintering-inhibitor region at a surface of the primary ceramic coating, wherein the sintering-inhibitor region removes oxygen vacancies from the primary ceramic coating.

20. (New) The method of claim 19, wherein the primary ceramic coating is yttria-stabilized zirconia.

-6-

21. (New) The method of claim 19, wherein the sintering-inhibitor region comprises cerium oxide with the cerium in the +4 valence state.